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T. Olsen
20 Je. 1907

THE

Subterranean Gas Generator

MADE BY

WALWORTH MANUFACTURING CO.

Nos. 67 to 73 KILBY STREET,

BOSTON.

BOSTON:
HOLLIS & GUNN, PRINTERS, 31 HAWLEY STREET.
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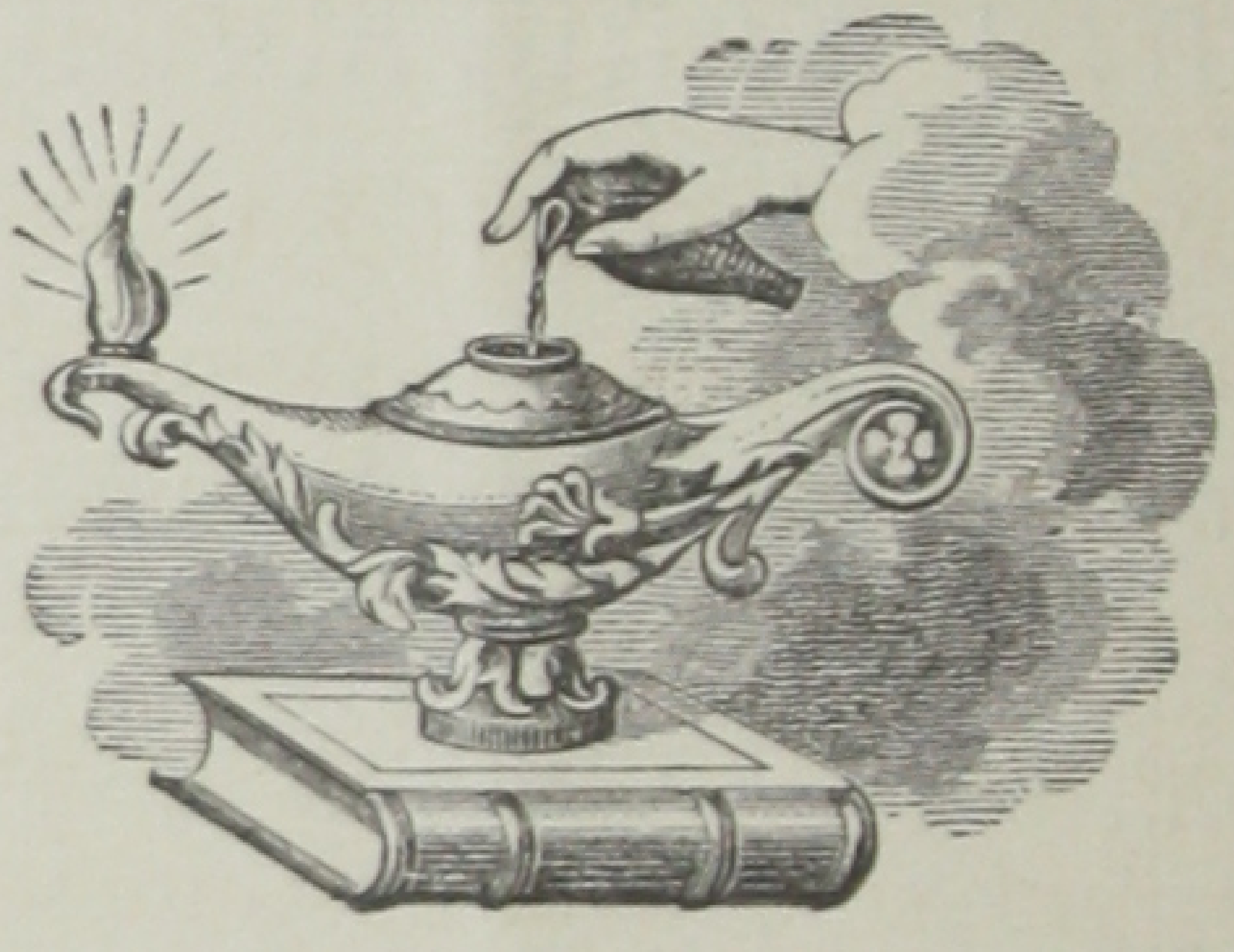

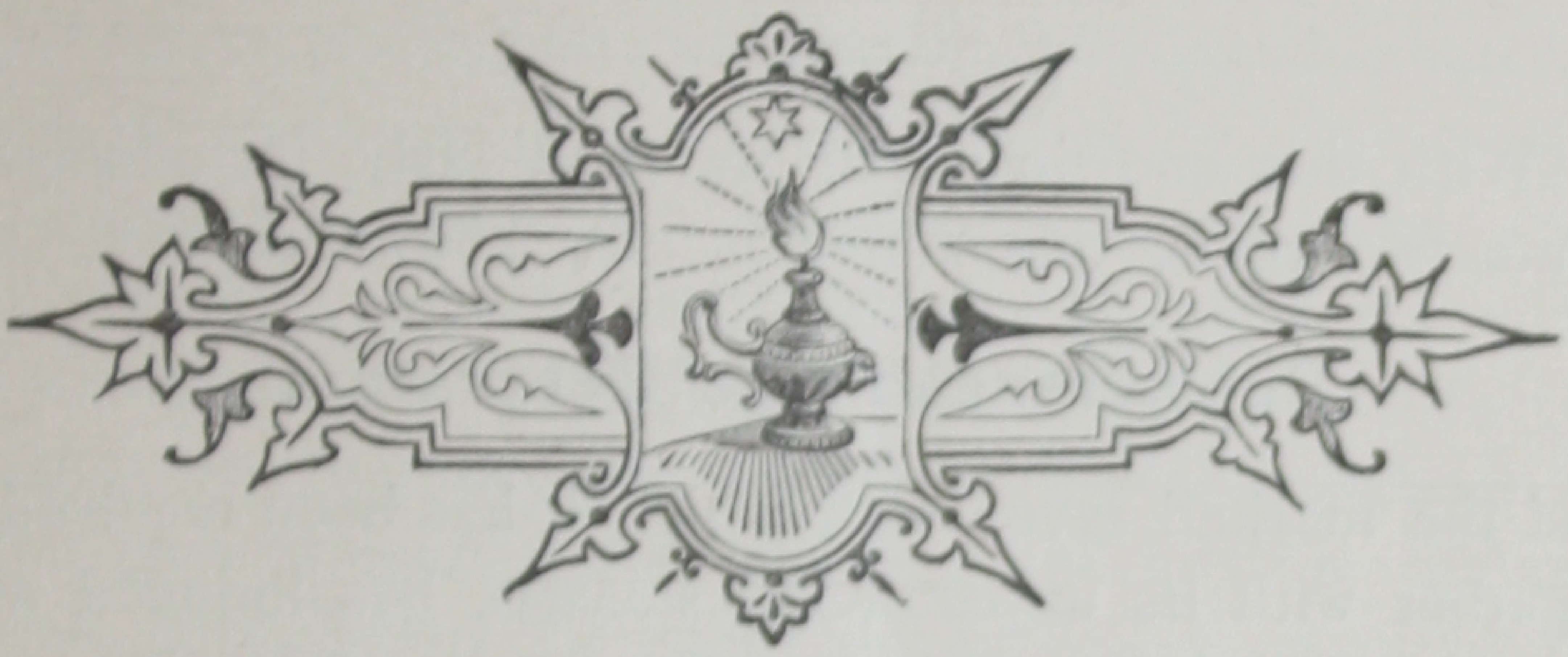

The Subterranean Gas Generator.

THE WALWORTH MANUFACTURING COMPANY, for a number of years, have been engaged in the manufacture of apparatus, for supplying *illuminating gas* to such buildings as are located outside the limits of city gas works; during which time they have made and sold a large number of gas generators, known as the SOLAR GAS GENERATOR, which have earned the enviable reputation of being the best in the market.

In the course of our experience in this business, we saw the necessity of building a comparatively inexpensive gas apparatus for lighting private residences in our suburban and rural districts.

Consequently we bestowed much thought and observation upon the subject, and finally arrived at the conclusion, that we might make a modification of our well-known "Solar Gas Generator," which would practically answer the required purpose without essentially sacrificing the merit of the apparatus.

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With this end in view, we cautiously introduced, some two years, that which is now known as the

Subterranean Gas Generator;

and the marked favor with which it has been received, together with its unparalleled success, has induced us to recommend it to the public as the cheapest and best Gas Generator in the market, being especially adapted to lighting *private residences*, and such places as require but comparatively few burners.

The construction of our "Solar Gas Generator" is such that a *brick vault* is required as a receptacle for the generator. This apparatus is particularly adapted to lighting manufactories, hotels, public buildings, &c., where a large number of lights is required; but the "Subterranean" is intended for dwelling house use, where only a moderate number of burners is required, and its construction is such that the generator is entirely *buried in the ground*, thus saving the expense of a brick vault.

By adopting this method, the apparatus can be put in at slight expense. And experience has proved that by locating the generator underground, some eight or ten feet below the surface, a remarkably even quality of light is produced. This result is accounted for by the *even temperature of the earth*, which, to a certain degree, supplies the place of artificial heat.

It is a well known fact, that the process of evaporation produces refrigeration, and as the process of making this gas is simply the evaporation of gasoline, it follows that there is a sensible loss of heat while the gas is burning; and unless this lost heat is restored, there would be, in the course of a few hours, a marked dimunition in the quality of the light.

As the generator is in direct contact with the earth, the temperature of which, at the depth of ten feet, is about fifty degrees Fahrenheit, it is in obedience to the laws of nature that the loss of heat is immediately restored to the generator by the warmth of the earth surrounding it. Thus it is that we are enabled to obtain such satisfactory results by this method of lighting.

The generator, the part containing the gasoline, being placed underground, is in a perfectly safe position, where it is absolutely impossible for fire to communicate with it in any way. Neither does it mar the appearance of the grounds, as the lawn or garden can be as smooth and level as though they had never been disturbed.

The process of making the gas, is simply the passing of a current of atmospheric air over, and in contact with, a body of gasoline, where it takes up the requisite quantity of hydro-carbon vapor, thence through the pipes to the burners. It is necessary, therefore, in the construction of the apparatus, to have an *air pump* to force the air, and a *generator* for containing the gasoline. As hitherto explained, the generator is buried in the ground any desirable distance from the house, while the air pump, which contains nothing but air and water, is placed within the building, usually in the cellar, as being the most convenient place.

The air pump, which is propelled by a weight, requires no manipulation, excepting to be wound up once or twice a week, depending upon the amount of gas consumed. It is so arranged that it can be wound up while the lights are burning without putting them out.

The air is conducted from the pump through an underground pipe to the generator, through which it passes, becoming impregnated with the vapor of gasoline, thence through another pipe to the house, where it is distributed to the burners, the same as coal gas.

In the manufacture of the apparatus, we use for the air pump, which is the only part exposed to wear, the best *sheet brass*, while the generator is made of heavy *cast iron*, a combination of metal, which insures an apparatus of permanent value.

It is well known that cast iron, when buried in the ground, will last for many years without decay; and an experience of ten years has proved that no oxidation takes place upon the inner surface of our generators.

Gasoline is one of the products of petroleum, produced, like kerosene, by distillation. It is cheap and abundant, and the probabilities of a future supply run parallel with those of kerosene, as the production of one involves necessarily that of the other.

At present, there is in the oil region of Pennsylvania alone, a larger production of petroleum, than is required for the consumption of the entire world, so far as it has been introduced.

The gasoline is transported in barrels, and poured directly into the generator, by means of a rubber hose, one end of which is attached to the barrel by a faucet, and the other to the filling pipe.

The gas produced by these generators surpasses, in brilliancy and softness of light, the best coal gas, *emitting no odor in combustion, and costing only about one-half the price of the latter.*

There has been a somewhat prevalent timidity in the public mind, in regard to the use of "gas machines," owing mainly to the crude and unskilful, and sometimes dangerous devices that have been urged upon the community in years past. It is not, therefore, without well-grounded convictions, and a due sense of responsibility, that we here say, that the apparatus now offered to the public, constructed and put up as herein described and directed, is as absolutely free from danger as is the use of ordinary coal gas.

Insurance is readily obtained on buildings lighted with this gas without any additional premium.

The almost entire exemption from care or labor in the management of this apparatus, must commend it strongly to public favor.

When once set up and in running order, it requires no other attention than the occasional filling the generator with gasoline, and the winding up of the weight, which is scarcely more than that required for the winding of an ordinary clock.

The accompanying cut, with annexed description, will be readily understood.

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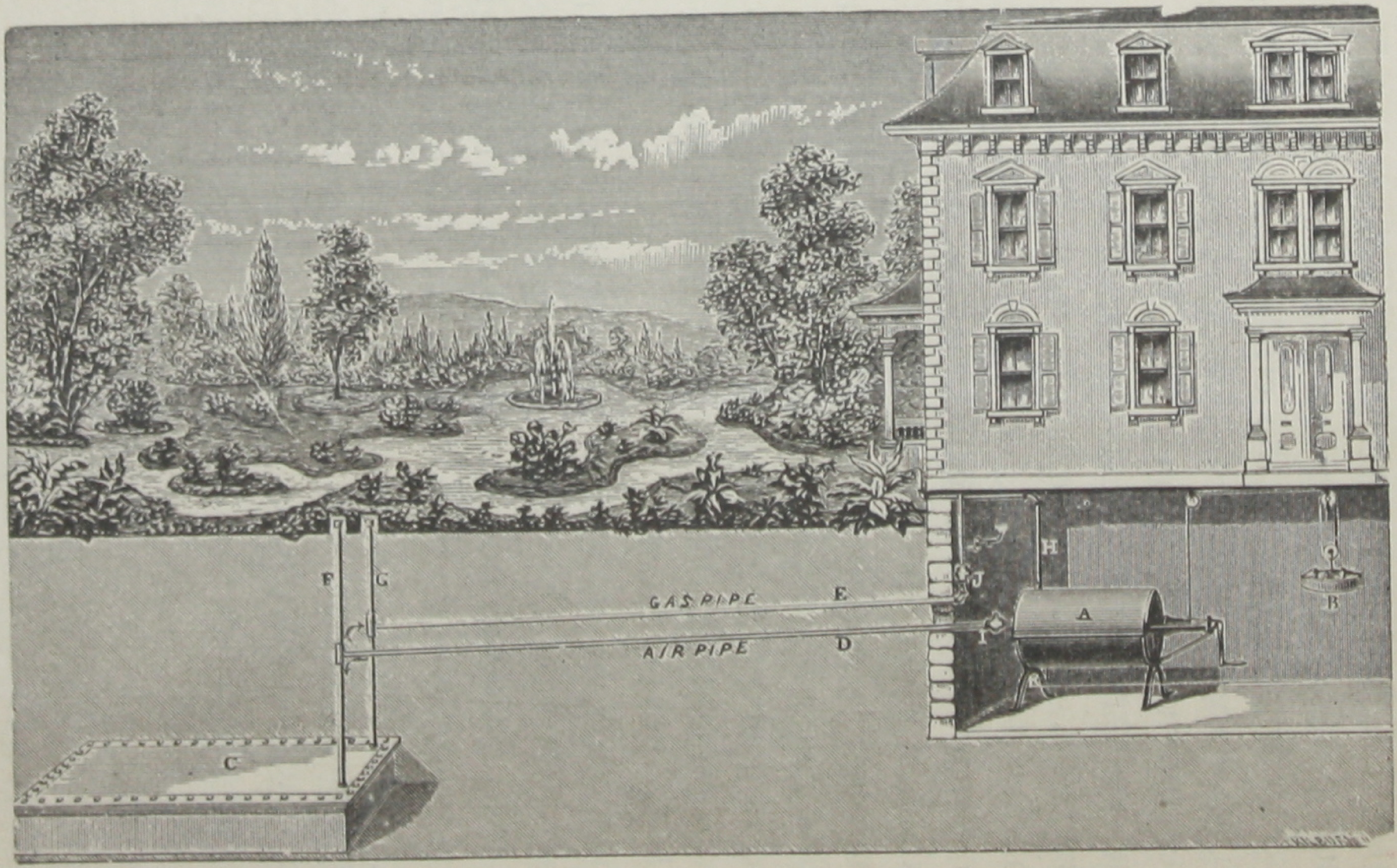


Generator, ten feet under ground.

Air Pump in cellar of house.

SUBTERRANEAN GAS GENERATOR.

DESCRIPTION.

A is the Air Pump propelled by the weight **B.** **D** is the Air Pipe through which air is forced to the Generator **C**, where it unites with the vapor of gasoline, thus producing the gas which is carried through the pipe **E** to the burners. **F** is the filling pipe through which gasoline is poured into the Generator. **G** is a vent pipe to allow the escape of gas while filling. **I** and **J** are gas-cocks for shutting off the pressure from the Air Pump or Generator. **H** is the induction pipe, for supplying air to the Air Pump. **K** is a plug for drawing off the water from the Air Pump.

PRICE-LIST.

20 Lights, holding 65 gallons Gasoline (Brass Air Pump)	$300.00
40 Lights, holding 65 gallons Gasoline (Brass Air Pump)	350.00
60 Lights, holding 110 gallons Gasoline (Brass Air Pump)	450.00

DIRECTIONS

FOR SETTING UP AND OPERATING THE SUBTERRANEAN GAS GENERATOR.

SELECT a location twenty-five feet, more or less, from the building to be lighted, in a warm dry exposure if practicable, and on ground at least as low as that upon which the building stands, so that the bottom of the excavation shall be a little below that of the cellar where the air pump stands. The excavation should be from five to ten feet deep, according to whether the apparatus is to be used in summer or winter. If it cannot be carried ten feet on account of water or other obstructions, the earth can be thrown upon the top in a mound form.

The dimensions of the excavations are as follows:—

For a 20 light, 7 feet long by 5 feet wide.
For a 40 light, 7 feet long by 5 feet wide.
For a 60 light, 8 feet long by 5 feet wide.

In setting the Generator be sure to place it in a firm position, so that the earth will not settle and throw it out of level. The air and gas pipe should both have a downward tendency towards the Generator, and be from three to four feet underground.

The filling pipe is attached to the gas pipe, the connection being made by a *tee*, as shown in the cut. The vent pipe is attached to the air pipe in the same manner.

In setting the air pump see that it is perfectly level, and that the feet rest squarely on the foundation, so that the shaft shall not bind and cause uneven pressure.

The guiding pulley should come directly over the centre of the winding drum, as shown in the cut.

In reeving the pulleys be sure that the rope runs in the grooves of the wheel, and that it does not chafe or bind in any place.

Fill the water up to the "water line," indicated on the end of the tank, and always keep it at this level.

The connection between the air pipe and air pump should be made with a *tee* (the spare outlet plugged) instead of an elbow; by removing this plug the *condensed water*, which sometimes accumulates in sufficient quantities to affect the lights, can be drawn off.

Whenever the house is to be vacated for the winter, and the apparatus left unused, the gas cocks N and O should be closed. Always remove the water from the air pump when the apparatus is to be left unused during the winter; it can be drawn off through the plug M. In order to empty the cylinder of the pump, it is necessary *to revolve it backwards*, first letting the weight run down. This can be done by taking out the plug in the *tee* which connects the air pipe to the pump, or by lifting the pall of the ratchets on the winding drum; there is a small hole for this purpose under the lower one through which a nail can be inserted and the pall held in the desired position. The upper one is to be thrown back so as to clear the teeth of the ratchet. After doing this, the weight should be allowed to run down slowly, first putting the crank on to steady the motion.

The following is the amount of weight generally required; it can be increased or diminished according to circumstances: 20 lights, 300 pounds; 40 lights, 400 pounds; 60 lights, 600 pounds. To determine the desired amount of pressure, light all the burners. The weight pan is usually filled with stone or old iron, filling the interstices with sand. Always remove the *crank* after winding. Oil the pulleys and other bearings once a month. *Never go near the apparatus with a lighted lamp or match.*

To ascertain the quantity of gasoline in the Generator, remove the plug in the filling pipe, and measure the depth with a stick. Should it ever become necessary to remove the residuum from the Generator, it can be done by putting a small pipe, connected to a drip-pump, through the filling pipe and pump it out.

The general rules and regulations of Gas companies, in regard to dimensions of pipes, &c., are applicable to this gas, with the single exception, that the dimensions of pipes should be *one size larger* through the scale.

The following is the Boston Gas Company's scale:—

Size of Piping.	Greatest Length allowed.	Greatest No. of Burners	Size of Piping.	Greatest Length allowed.	Greatest No. of Burners	Size of Piping.	Greatest Length allowed.	Greatest No. of Burners
⅜	20 feet.	3	1	70 feet.	35	2	200 feet.	200
½	30 "	6	1¼	100 "	60	2½	300 "	300
¾	50 "	20	1½	150 "	100	3	450 "	450

As with coal gas—all pipes should have a slight descending inclination towards the generator; all branches should be taken out of the *side or top* of the running pipe, rather than the bottom. Pipes leading to brackets should *come up* where practicable, rather than down to the brackets.

The underground gas main should be one size larger than the principal main within the building.

In selecting "fixtures," state the kind of gas to be used, and see that the gas ways through them are ample in size.

REFERENCES.

T. JEFFERSON COOLIDGE,	Boston,	House at	Magnolia,	Mass.
WM. R. ROBESON,	“	“	Lenox,	“
K. W. SEARS,	“	“	Nahant,	“
WM. AMORY, Jr.	“	“	E. Braintree,	“
WM. E. COFFIN,	“	“	Savin Hill,	“
WM. B. STEARNS,	“	“	Clifton,	“
WM. S. STEARNS,	“	“	“	“
WM. E. BAKER (3 machines),	“	“	Wellesley,	“
IVORY BEAN,	Jerusalem	Road,	No. Cohasset,	“
W. BROWN,	“	“	“	“
G. T. W. BRAMAN,	“	“	“	“
JOSEPH DAVIS,	“	“	“	“
S. S. ROWE,	“	“	“	“
HENRY TOLMAN,	“	“	“	“
EDWIN POPE,	“	“	“	“
E. P. CARPENTER,	Foxboro,	House at	Oak Bluffs,	“
Dr. H. A. TUCKER,	Brooklyn, N.Y.	“	“	“
J. S. SPINNEY,	New York,	“	“	“
PAWNEE HOUSE,			“	“
CENTRAL HOUSE,			“	“
ISLAND HOUSE,			“	“
T. J. GIFFORD,			New Bedford,	“
W. H. STIMSON,			Mattapoisett,	“
FRANCIS AMBLER,			Weymouth,	“
A. W. CLAPP,			“	“
S. W. PRATT,			“	“
CATHOLIC CHURCH,			“	“
N. D. CANTERBURY,			E. Weymouth,	“
JAMES H. CLAPP,			“	“
TOWN HALL,			Bridgewater,	“
ZEBULON PRATT,			“	“

D. B. GURNEY,	South Abington,	Mass.
DAVIS GURNEY,	“	“
H. A. BATES,	“	“
S. B. SHAW,	Rockland,	“
W. G. PERRY,	“	“
WM. L. WHITE,	Taunton,	“
O. HUNTON,	Plymouth,	“
AUGUSTUS LOTHROP,	Boston, House at Hingham,	“
WM. FEARING, 2d,	Hingham,	“
ISRAEL WATERHOUSE,	Wollaston Heights,	“
E. H. SANBORN,	“ “	“
A. WOODWARD,	Ashmont,	“
J. W. PRATT,	Randolph,	“
G. D. WILLIS,	South Braintree,	“
A. R. CLAPP,	Grantville,	“
J. C. JACKSON,	“	“
S. F. TWITCHELL,	South Framingham,	“
R. D. WOODS,	Enfield,	“
W. R. DUPEE,	Chestnut Hill,	“
CHARLES H. SOUTHER,	West Roxbury,	“
LEVI L. WILLCUTT,	“	“
HORACE FARRINGTON,	“	“
H. E. RAYMOND,	Brookline,	“
J. M. ROBBINS,	Norwood,	“
D. D. BOWMAN,	Nonantum Hill, Brighton,	“
MISS E. A. SHILLABER,	“ “ “	“
J. H. BARBOUR,	Swampscott,	“
H. M. GEORGE,	East Saugus,	“
HARMON HALL,	“	“
MRS. HARRIET MORGAN,	Cambridge,	“
FITCHBURG RAILROAD DEPOT,	“	“
FITCHBURG RAILROAD DEPOT,	Concord,	“
T. H. GOODSPEED,	Athol,	“
PHILANDER DERBY,	Gardner,	“
W. H. GREENE,	Rocky Point,	R. I.
A. E. TAYLOR,	New Britain,	Conn.
WM. PARKER,	“	“
T. F. HAMMER,	Branford,	“

E. O. CLARK (2 machines),	Waldoboro,	Maine.
WILLIAM HOBBS,	North Berwick,	“
HENRY ROBERTS,	Alfred,	“
B. F. PRESCOTT,	Epping,	N. H.
W. F. HEAD,	Hookset,	“
H. A. TUTTLE,	Pittsfield,	“
N. B. PRESCOTT,	Derry,	“
T. J. OTTERSON,	Suncook,	“
C. H. GREENLEAF,	Littleton,	“
F. J. EASTMAN,	Tilton,	“
W. H. DuBOIS,	West Randolph,	Vt.
F. PARKS,	Springfield,	“
A. WOOLSON,	“	“
L. A. BATTERSHALL, New York,	House at Sea Cliff,	L. I.
W. D. BAKER,	Philadelphia,	Pa.
C. GODFREY,	Wallingford Station,	“
B. LANDRETH,	Bristol,	“
B. A. ARMISTEAD,	Portsmouth,	Va.
COLUMBUS WATER WORKS,	Columbus,	Ohio.
L. J. ROSE,	Los Angeles,	Cal.

TESTIMONIALS.

BOSTON, April 25, 1874.

WALWORTH MANUFACTURING CO.

GENTLEMEN,—It gives me pleasure to say that the Subterranean Gas Generator, which you furnished for my house at Cohasset a year ago, has given me entire satisfaction thus far. In fact, the light has been so uniformly good, and the apparatus managed with so little trouble, that several of my neighbors have been induced to purchase similar machines of you. This I consider to be the *best practical evidence* of the merits of your apparatus, and therefore feel that further remarks are unnecessary. Respectfully yours,

IVORY BEAN.

Office of the BOSTON FLAX MILLS,
83 & 85 Commercial St.,
BOSTON, April 21, 1874.

WALWORTH MANUFACTURING CO.

DEAR SIRS,—I bought one of your Subterranean Gas Generators last December, and have depended entirely on it for light in my house, and have not been disappointed in my expectations. We have never had the least trouble with it in any way, and the light is very steady, and the quality uniformrly good. I had thought of using your more expensive machines, but desire nothing better than this. Yours truly,

JOHN C. JACKSON.

WOLLASTON HEIGHTS, April 14, 1874.

WALWORTH MANUFACTURING CO.

GENTLEMEN,—The Subterranean Gas Generator that you furnished for my house a year ago, has given me entire satisfaction in all respects, being perfectly safe and reliable, and very easily managed. I can heartily recommend it to those in want of a good Gas Generator.

Respectfully yours, E. H. SANBORN.

April 15, 1874.

WALWORTH MANUFACTURING CO.

GENTLEMEN,—The Subterranean Gas Generator which you put in for me last fall, at Chestnut Hill, has given me excellent satisfaction. I have used it constantly during the winter, and have found the light to be steady, reliable, and brilliant, and much pleasanter to the eye than coal gas.

The Generator is buried in the ground some nine or ten feet deep, beyond the liability to accident. The ease and convenience with which it is managed, as well as simplicity of construction, are strong recommendations to those who are contemplating the use of a gas apparatus.

Respectfully yours, W. R. DUPEE.

DARBY ROAD, 66th Street, 27th Ward,
PHILADELPHIA, April 24, 1874.

WALWORTH MANUFACTURING CO.

GENTLEMEN,—I am much obliged to you for the introduction of the Subterranean Gas Generator, which was put in by your agent, Mr. Samuel Crowther. It has not ceased to work admirably for the year it has been in use, both winter and summer. The light is brilliant, steady, and soft, and, therefore, is not injurious to the sight. I regard it as one of the greatest inventions of the day. Considering its quality, it is the cheapest light I know of, except sunlight. Yours truly,

WILLIAM D. BAKER.

The following letter was published in the "New Britain (Conn.) Record," January 9, 1874: —

MR. EDITOR,—In your issue of last week you notice a "gas apparatus" in use by me for lighting my house. Since then a number of our citizens have made inquiries with reference to it. In reply to such inquiries in general I would say that for the last three years or more I have used my best powers of persuasion to induce the New Britain Gas Co. to lay pipes to my residence (offering to guarantee the company against loss), but without avail. And as I had at last become completely tired of, and disgusted with, kerosene, I made it a special business to inquire into the merits of the SUBTERRANEAN GAS GENERATOR, and was induced by its many flattering testimonials, and by my own examination, to try it. Accordingly, I secured a "thirty-light machine." I am delighted with its operation, and congratulate myself that the Gas Company did not yield to my persuasions. I would not change my present arrangement on any consideration. The gas produces a steady flame, — soft and mellow, without flickering, brilliant without glaring. The apparatus is very easily managed, requiring less than five minutes per week. It is just as free from danger as ordinary coal gas. The reservoir is forty feet from the house and ten feet under ground. As to the difference in cost, compared to coal gas, your readers may estimate for themselves. This proportion may aid them: As one thousand feet of gasoline is to one thousand feet of coal gas, so is $1.50 to the cost of coal gas.

A. E. TAYLOR.

BANKING OFFICE OF DU BOIS & GAY,
WEST RANDOLPH, VT., April 22, 1874.

WALWORTH MANUFACTURING CO.

GENTLEMEN,—Since November last my house has been lighted with gas made by your Subterranean Gas Generator, which has so far worked entirely satisfactory, giving us an abundance of good gas light, without any danger or annoyance whatever. My Generator is located about fifty feet from the house on the *north side* and was put in when there was four inches of frost in the ground; but from the day of connecting it with the Air Pump in the cellar, it has furnished good light all over my house, and I consider it indispensable to a first-class country residence, and cheerfully recommend it to *any one* in want of good light at a moderate cost.

Very truly yours, WILLIAM H. DU BOIS.

WEYMOUTH, April 15, 1874.

WALWORTH MANUFACTURING CO.

GENTLEMEN,—The Subterranean Gas Generator that you furnished for my house in Weymouth, nearly a year ago, has given entire satisfaction thus far. Fully appreciating the luxury of the light furnished by your apparatus, I can heartily recommend it.

Respectfully yours, FRANCIS AMBLER.

NEW YORK, April 23, 1875.

WALWORTH MANUFACTURING CO.
69 KILBY STREET, BOSTON.

GENTLEMEN,—I am glad to say that the Gas Machine manufactured by you, which was put in my place at Sea Cliff, L. I., last fall has given me *perfect satisfaction.* I have had *a splendid light all winter*, and am now using the second barrel of gasoline since last October. I find that I have all the light I want for about three dollars per month. Very truly yours,

L. A. BATTERSHALL.

BRIDGEWATER, MASS., March 1st, 1875.

WALWORTH MANUFACTURING CO.

GENTLEMEN,—The thirty light Subterranean Gas Machine which I purchased of you last summer, has been in constant use since the first of September and has given perfect satisfaction, giving a brilliant and perfectly steady light, and has not been effected in the least by the extreme cold winter weather. I consider it superior to any other machine I have seen, and would recommend it as being perfectly safe and reliable.

ZEBULON PRATT.

BRIDGEWATER, MASS., March 4, 1875.

WALWORTH MANUFACTURING CO.

GENTLEMEN,—The Subterranean Gas Machine which I purchased of you about one year ago for our Town Hall, has been in very frequent use up to the present time with the best of results. The capacity of the Machine is rated at about seventy-five lights, and several times during the spring and fall of last year, forty-five lights were burned from 8 P.M. to sunrise, without any perceptible change or dimness of light. Since Nov. 16th to March 1st the Machine has been in use twenty-nine evenings, burning from forty to sixty burners from two hours to eight hours per evening, and never once failing or growing dim, the thermometer in several instances being nearly at zero. It costs to light the Hall with forty burners, forty-five cents per hour, the light being equal in brilliancy to at least seventy-five or eighty of the best kerosene lamps. I consider the Machine perfectly safe and reliable. It requires no care or attention (excepting to wind up the weight), as there is nothing which can get out of order. I would recommend this Machine as superior to any in the market, where eighty or one hundred lights is required.

SUMNER KEITH.

SPRINGFIELD, VT., March 5, 1875.

WALWORTH MANUFACTURING CO.

GENTLEMEN,—The two Subterranean Gas Generators, which you put into our respective residences last summer, have more than met our most sanguine expectations, giving a beautiful and ample light without any perceptible variation during this long extremely cold winter, the mercury sometimes being as low as *thirty degrees below zero.*

With the excellent quality of gasoline furnished by your company we have no hesitation in saying that the machines are all that can be desired.

Respectfully yours,
F. PARKS.
A. WOOLSON.

ATHOL, MASS., March 5, 1875.

WALWORTH MANUFACTURING CO.
BOSTON, MASS.

GENTLEMEN,—The Gas Generator, put in by your company a year ago last fall for me, with which to light my house and office, has given me entire satisfaction, working splendidly all the time, and not requiring ten minutes time in a week to take care of it. During the severe cold weather of the past winter there has been no perceptible difference in the light from mid-summer, the cold not affecting the workings of it in the least.

Yours very truly, THOMAS H. GOODSPEED.

WALWORTH

MANUFACTURING COMPANY,

Manufacturers and Dealers in

WROUGHT IRON PIPE & FITTINGS,

STEAM PUMPS, BOILERS and ENGINES.

STEAM and GAS FITTERS' TOOLS and SUPPLIES.

GAS APPARATUS

FOR LIGHTING DWELLING HOUSES, MANUFACTORIES, PUBLIC BUILDINGS, AND TOWNS.

Steam and Hot Water Warming and Ventilating Apparatus,

Foundries and Machine Shops at Cambridgeport.

OFFICE AND SALESROOMS AT

Nos. 67 to 73 KILBY STREET, BOSTON.

J. J. WALWORTH,	C. C. WALWORTH,	E. C. HAMMER,
President.	*Vice-President.*	*Treasurer.*

HOT WATER APPARATUS,

FOR WARMING

DWELLING-HOUSES,
GREEN-HOUSES,
SCHOOL-HOUSES,

BANKS, PUBLIC HALLS, ETC.

The marked favor which has been accorded to our improved Apparatus by all who have used it, has led us to expend much thought and labor in simplifying and perfecting this method of warming. It possesses several important advantages over steam apparatus, among which are

PERFECT SAFETY, EASE OF MANAGEMENT,

And Especially the Admirable Facility with which the temperature of Rooms can be regulated,—an advantage wholly unattainable with the use of steam.

The apparatus, being thoroughly constructed of best materials, is very durable, seldom needing repairs.

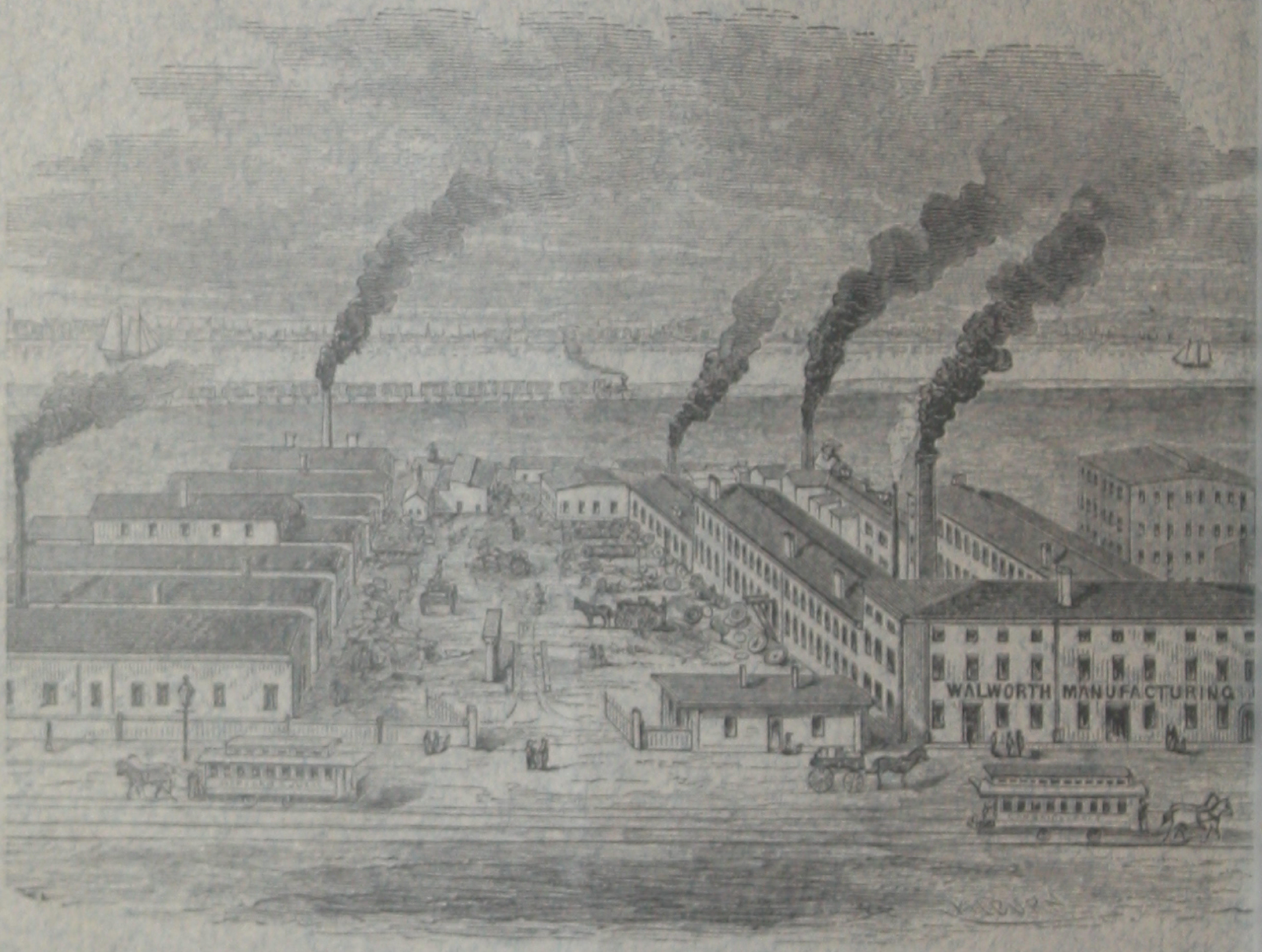
Walworth Manufacturing Company,

67 and 73 Kilby Street, Boston.

WORKS

OF THE

WALWORTH MANUFACTURING COMPANY,



CAMBRIDGEPORT, MASS.

Office and Salesroom, Nos. 67 to 73 Kilby Street, Boston.

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INTERNATIONAL

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